Attorney Docket: 313KA/36119CO
PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: TORU TAKAMIZAWA ET AL.

Serial No.: 08/620,541

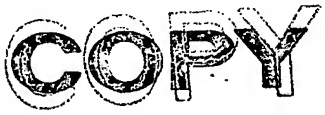
GROUP ART UNIT: 3206

Filed: MARCH 25, 1996

Title: PRELOADING METHOD FOR PRELOAD-ADJUSTABLE ROLLING BEARING AND MANUFACTURE OF THE SAME

SUPPLEMENTAL PRELIMINARY AMENDMENT

Assistant Honorable Commissioner of
Patents and Trademarks
Washington, D.C. 20231



Sir:

Supplemental to the Preliminary Amendment filed on March 25, 1996, please undertake the following changes:

IN THE CLAIMS:

Please cancel claims 50-53 in their entirety and add the following new claims:

--54. A preload-controllable bearing apparatus comprising first and second members which are relatively rotatable to each other,

the first member having first and second raceways which are fixed in a direction to come closer to each other with reference to the first member,

the second member having a third raceway which is opposed to the first raceway of the first member with a first ball row therebetween, and a fourth raceway which is opposed to the second raceway of the first member with a second ball row therebetween

the third raceway being fixed in a direction to be separated from the fourth raceway with reference to the second member,

the fourth raceway being fitted to the second member with an

interference so as to be relatively movable to each other,

the interference causing a force against movement which is larger than the axial reaction force to a preload to be exerted through the first raceway, the first ball row, the third raceway, the fourth raceway, the second ball row, the second raceway and the first raceway,

the preload being adjustable based on an axial pressure to be applied to between the fourth raceway and the second member,

the first member being an outer ring while the second member being a shaft extending through the outer ring, and

the third and fourth raceways being an independent member fitted to the shaft.

55. A preload-controllable bearing apparatus comprising first and second members which are relatively rotatable to each other,

the first member first and second raceways which are fixed in a direction to come closer to each other with reference to the first member,

the second member having a third raceway which is opposed to the first raceway of the first member with a first ball row therebetween, and a fourth raceway which is opposed to the second raceway of the first member with a second ball row therebetween

the third and fourth raceways being fitted to the second member with an interference so as to be relatively movable to each other,

the interference causing a force against movement which is larger than the axial reaction force to a preload to be exerted through the first raceway, the first ball row, the third raceway,

the fourth raceway, the second ball row, the second raceway and the first raceway,

the preload being adjustable based on an axial pressure to be applied to between the fourth raceway and the fourth raceway,

the first member being an outer ring while the second member being a shaft extending through the outer ring, and

the third and fourth raceways being an independent member fitted to the shaft.

56. The preload-controllable bearing apparatus of Claim 54 or 55, wherein the raceways has an arcuate shape in cross section.

57. The preload-controllable bearing apparatus of Claim 54 or 55, wherein the fourth raceway has a first side face and the third raceway has a second side face such that the first and second side faces are opposed to each other with a gap therebetween.

58. The preload-controllable bearing apparatus of Claim 54 or 55, wherein the preload is exerted through the first raceway, the first ball row, the third raceway, the fourth raceway, the second ball row, the second raceway and the first raceway.

59. The preload-controllable bearing apparatus of Claim 54 or 55, wherein the raceways is a type of deep groove.

60. The preload-controllable bearing apparatus of Claim 54 or 55, wherein the preload is a DB type.

61. The preload-controllable bearing apparatus of Claim 54 or 55, wherein the ball rows have a contact angle in the range of from 10 to 30 degrees.

62. The preload-controllable bearing apparatus of Claim 54

or 55, wherein the ball rows have a ball PCD in the range of from 20 mm to 1.5 mm.

63. A preload-controllable bearing apparatus comprising first and second members which are relatively rotatable to each other,

the first member having first and second raceways which are fixed in a direction to come closer to each other with reference to the first member,

the second member having a third raceway which is opposed to the first raceway of the first member with a first ball row therebetween, and a fourth raceway which is opposed to the second raceway of the first member with a second ball row therebetween,

the third raceway being fixed in a direction to be separated from the fourth raceway with reference to the second member,

the fourth raceway being fitted to the second member with an interference so as to be relatively movable to each other,

the interference causing a force against movement which is larger than the axial reaction force to a preload to be exerted through the first raceway, the first ball row, the third raceway, the fourth raceway, the second ball row, the second raceway and the first raceway,

the preload being adjustable based on an axial pressure to be applied to between the fourth raceway and the second member,

the first member being an outer ring while the second member being a shaft extending through the outer ring, and the raceways having an arcuate shape in cross section.

64. A preload-controllable bearing apparatus comprising first and second members which are relatively rotatable to each

other,

the first member having first and second raceways which are fixed in a direction to come closer to each other with reference to the first member,

the second member having a third raceway which is opposed to the first raceway of the first member with a first ball row therebetween, and a fourth raceway which is opposed to the second raceway of the first member with a second ball row therebetween,

the third and fourth raceways being fitted to the second member with an interference so as to be relatively movable to each other,

the interference causing a force against movement which is larger than the axial reaction force to a preload to be exerted through the first raceway, the first ball row, the third raceway, the fourth raceway, the second ball row, the second raceway and the first raceway,

the preload being adjustable based on an axial pressure to be applied to between the third raceway and the fourth raceway,

the first member being an outer ring while the second member being a shaft extending through the outer ring, the raceways having an arcuate shape in cross section.

65. The preload-controllable bearing of Claim 63 or 64, wherein the fourth raceway has a first side face and the third raceway has a second side face such that the first and second side faces are opposed to each other with a gap therebetween.

66. The preload-controllable bearing of Claim 63 or 64, wherein the preload is exerted through the first raceway, the first ball row, the third raceway, the fourth raceway, the second

ball row, the second raceway and the first raceway.

67. The preload-controllable bearing of Claim 63 or 64, wherein the preload is a DB type.

68. The preload-controllable bearing of Claim 63 or 64, wherein the ball rows have a contact angle in the range of from 10 to 30 degrees.

69. The preload-controllable bearing of Claim 63 or 64, wherein the ball rows have a ball PCD in the range of from 20 mm to 1.5 mm.

70. The preload-controllable bearing of Claim 63 or 64, wherein the first member is integrally formed with the first and second raceways.

71. The preload-controllable bearing of Claim 63 or 64, the third and fourth raceways being an independent member fitted to the shaft.--

REMARKS

The present claims are 54-71.

The foregoing amendments to the claims have been made to place the claims in better form for U.S. practice. No new matter has been added.

If any fees are necessary, the Commissioner is authorized to charge Deposit Account 05-1323 (Attorney Docket No. 313KA/36119CO).

Respectfully submitted,

June 19, 1996

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